Aquatic & Wetland Plant Management

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CLEMSON
COOPERATIVE EXTENSION

Why control aquatic plants?

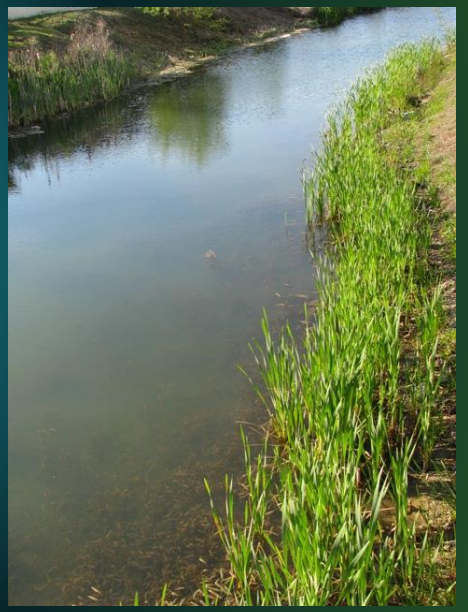
Aquatic and wetland plants are responsible for annual economic impacts measured in the billions of dollars nationwide. (ANS Task Force; Rockwell 2003)

They impede…

- irrigation
- industrial water use
- recreation
- flood control
- mosquito abatement
- navigation
- water quality
- fisheries
- aesthetics/property values
- altered fire regime

Benefits of Aquatic Plants

Wetland plants are **ESSENTIAL** to aquatic ecosystems



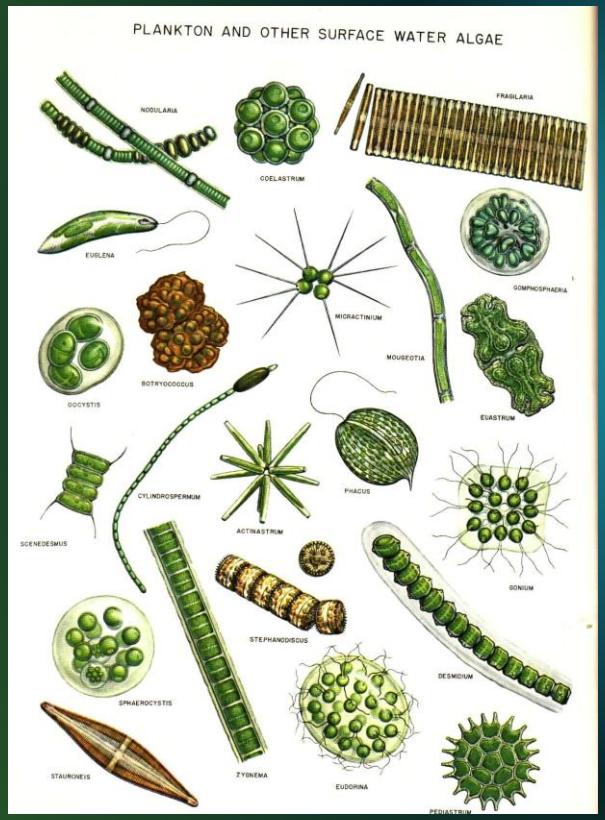
- Habitat/forage for aquatic Life
- Water treatment/WQ protection
- Erosion control
- Shade/temperature control
- Oxygenation/photosynthesis/primary productivity

Growth Habits of Wetland Plants

- Algae
- Submersed
- Free-floating
- Floating-leaved
- Sprawling Emergent
- Vertical Emergent
- Riparian

Shoreline

Algae

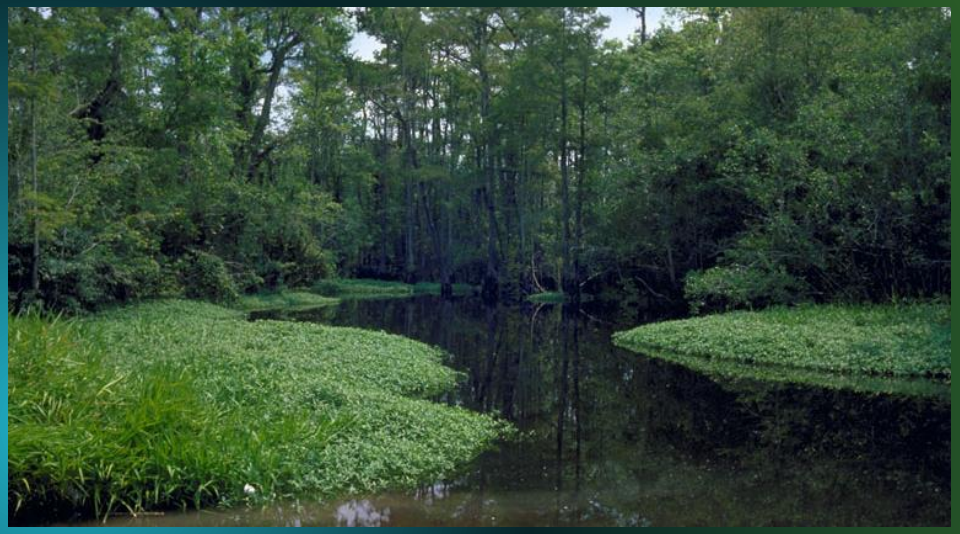

PLANKTON AND OTHER SURFACE WATER ALGAE
NODULARIA
COELASTRUM
FRAGILARIA
EUGLENA
GOMPHOSPHAERIA
MICRACTINIUM
MOUGEOTIA
BOTRYOCOCCUS
OOCYSTIS
EUASTRUM
PHACUS
CYLINDROSPERMUM
ACTINASTRUM
SCENEDESMUS
GONIUM
STEPHANODISCUS
DESMIDIUM
SPHAEROCYSTIS
STAURONEIS
ZYGNEMA
EUDORINA
PEDIASTRUM

Submersed Plants

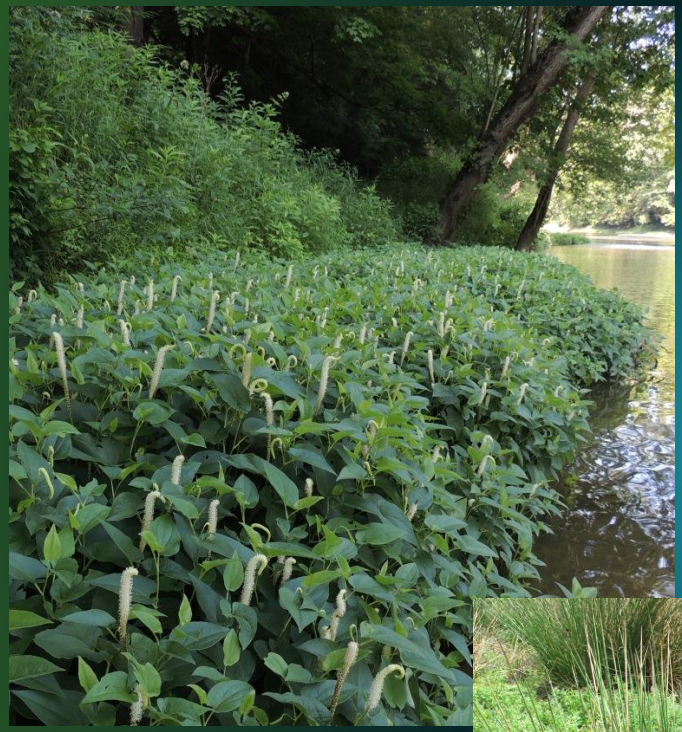
Free-floating Plants

Floating-leaved Plants

Sprawling Emergents

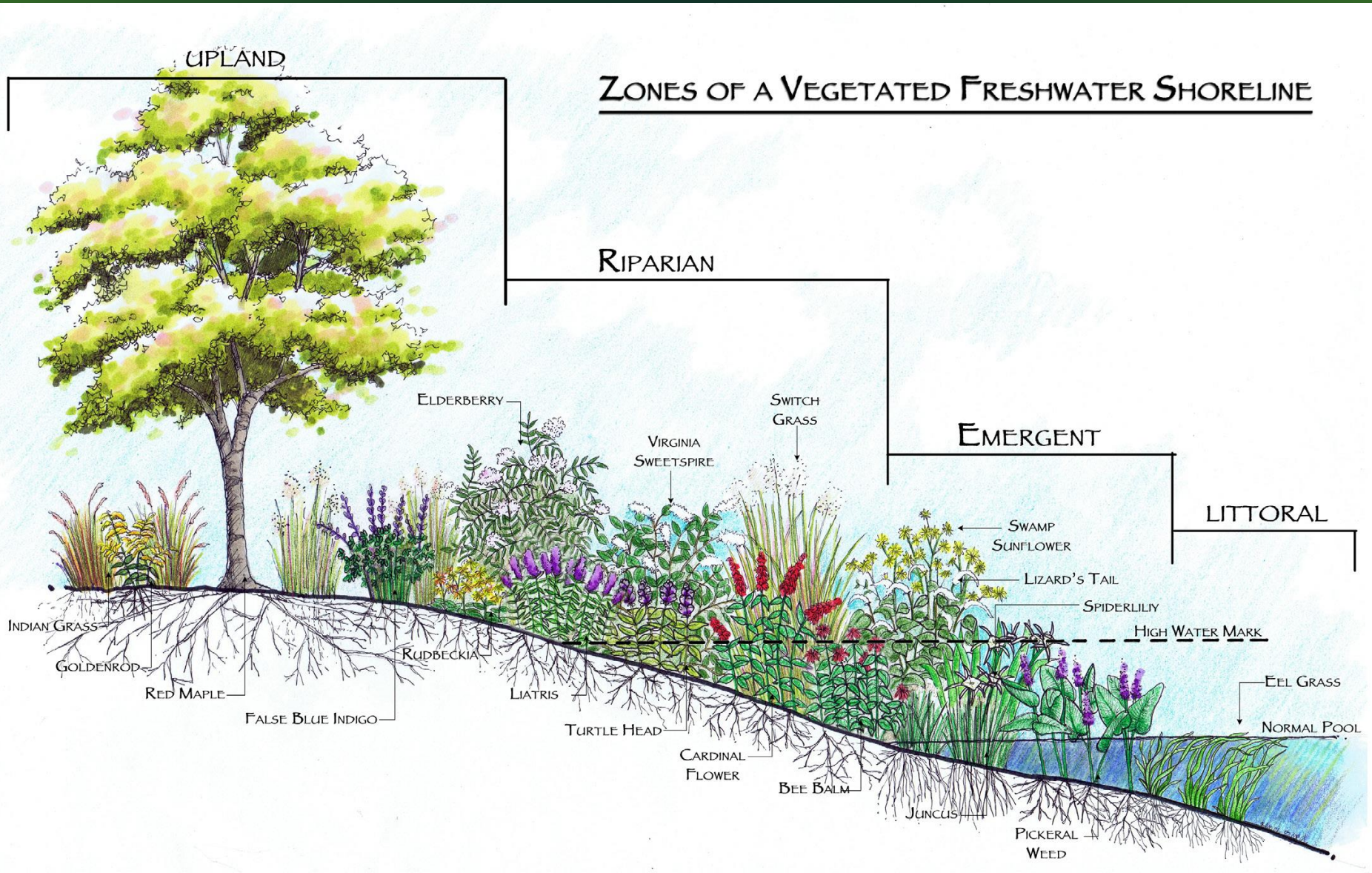


Vertical Emergents



Riparian Plants

Riparian Plants (cont.)


Zones of a Vegetated Freshwater Shoreline
Upland
Riparian
Emergent
Littoral
Elderberry
Switch Grass
Virginia Sweetspire
Swamp Sunflower
Lizard's Tail
Spiderlily
High Water Mark
Indian Grass
Goldenrod
Red Maple
False Blue Indigo
Rudbeckia
Liatris
Turtle Head
Cardinal Flower
Bee Balm
Juncus
Pickeral Weed
Eel Grass
Normal Pool

IPM for Wetland Weeds

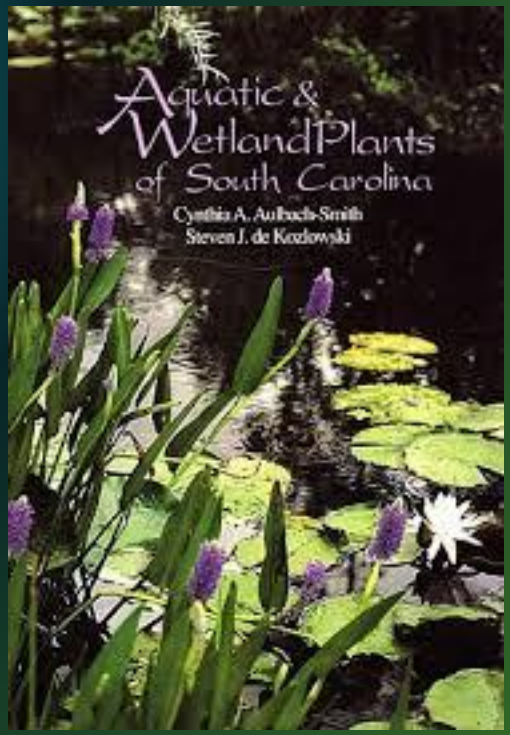
1. Establishing treatment thresholds
2. Physical Controls
3. Cultural Controls
4. Biological Controls
5. Chemical Controls
6. Preventative Measures

What's the first step in any pest control activity?

Identify the pest!

Aquatic and Wetland Plants of SC – SC DNR

Aquaplant – Texas A&M
http://aquaplant.tamu.edu/



Treatment Thresholds

- Having some aquatic plants benefits the system
- Thresholds depend on…
  - Type of system (pond, ditch, wetland etc.)
  - Type of plant (floating, submersed, shoreline, etc.)
  - Expectation of landowner/community
  - Economic ability

General thresholds to initiate control

a. Prevent submersed plants from “topping-out”
b. Keep submersed and floating vegetation from covering more than 20% of pond surface
c. Keep navigation channels free of vegetation
d. Protect shoreline plants for erosion control, but control them at access points
e. Limit trees and large woody plants along dams, ditches and shorelines
f. Control plants around water conveyances and control structures
g. Eliminate invasive and illegal species

Physical Controls

- Manually removing plants gives immediate results and may be the only solution in some instances
- Not an economical long term management strategy
- Aquatic and wetland habitats = difficult access and major labor!
- What to do with material? Fragmentation???
- May be the only option for rapid control in small areas.

Equipment for physical controls

- Rakes (submersed plants)
- Sickle bars (submersed, floating-leaved plants)
- Nets and skimmers (Free floating plants)
- Mechanical Harvester (submersed and floating plants)
- Excavator
- Benthic Barriers (emergent, submersed, and floating-leaved plants)

One other physical control - Dyes

- Aquatic Dyes reduce light penetration into water, preventing submersed plants from getting sunlight
- Not a labeled pesticide (unless it also contains copper)
- Must be applied early, before submersed plants reach surface and reapplied consistently
- Not feasible for stormwater ponds or ditches
- Only work when water is 3 ft or deeper
- Typically applied 1 gal per 4 acre-feet
- Do not work in very turbid ponds or ponds with high organic content
- Available in Blue, Green, and Black – can be mixed

Cultural Controls

Cultural activities that limit weed growth by creating disturbance that affects survivorship of certain groups of plants

- Draw-down/flooding
- Dredging
- Fertilizing
- Reducing nutrients
- Alternative planting
- Circulation
- Prescribed fire

Cultural Control: Draw-down/Flooding

- Winter draw downs expose roots of submersed plants to desiccation and freezing
  - Works in fish ponds, reservoirs, and ditches, but may not be accepted by residents around stormwater ponds, limited use close to coast

- Summertime flooding used to control shoreline plants
  - Not feasible in most situations and add erosion. May be useful for killing trees around a neglected pond. Unacceptable for stormwater retention!

Cultural Control: Dredging

Restoring depth limits aquatic plants and removing sediments eliminates seed bank

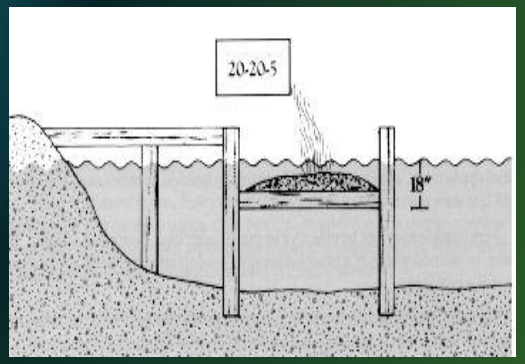
- Most submersed plants do not grow well in water deeper than 4 ft (depends on water clarity)
- Most emergent plants cannot grow in water deeper than 18 inches
- Dredging is also a physical control of tubers and seeds

Cultural Control: Liming & Fertilizing

Fertilizing fish ponds grows phytoplankton that…

1. increase turbidity and decrease light penetration
2. Fortify the food chain from the bottom up

- Fertilizing is only suitable for fish ponds
- Never apply fertilizers to stormwater or irrigation ponds
- Use balanced fertilizers N:P
- Liquids should be premixed with water
- Granular must be suspended off the bottom on a platform or in a filter sack
- Liming is <u>ESSENTIAL</u> if you plan to fertilize



Cultural Controls: Reducing Nutrients

Aquatic plants depend on nutrient concentrations in the water especially algae and floating plants

- Stormwater ponds with excessive weed growth
  - soil testing and proper fertilizing in landscape
  - no fertilizing on bank slopes
  - Reducing percent lawn , naturalizing
  - Pretreatment (forebays, sand filters, rain gardens)
  - Excavating phosphorous laden sediments

Cultural Controls: Alternative Plantings

Shorescaping – landscaping the shoreline using suitable native plants

- stop shoreline erosion, replace weedy species, filter nutrients

Floating Wetlands – Container gardens that float on the water surface

- absorb nutrients, shade water column

Cultural Control: Circulation

- Full water column circulation
- Diffusion aeration
  - Current reduces some cyanobacteria/algae
  - Oxygenating hypolimnion removes phosphates from the water
  - Improved fish health
  - Public perception

Cultural Control: Prescribed Fire

- Prescribed fire in wetlands has limited use
- A good method for getting plants to spend resources and accelerate growth.
- Timing is everything!
- Bad timing may release noxious species

Biological Controls

Using living organisms to control weeds

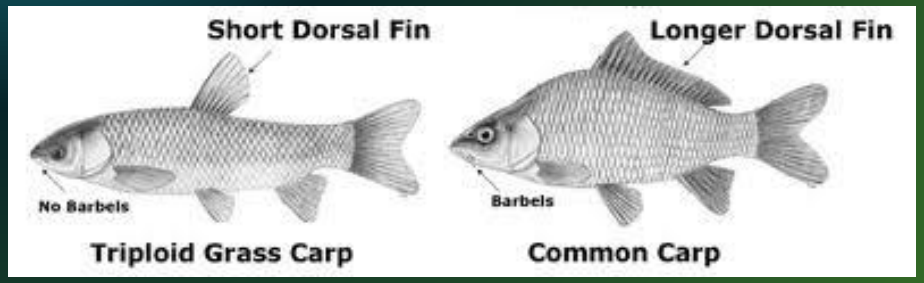
- fish, insects, diseases, others… goats?

Triploid Grass Carp

Tilapia

Triploid Grass Carp

- Most cost effective way of managing submersed weeds
- 5-8 years of control
- They do not control algae, floating, or emergent plants
- Must get a FREE permit from SC DNR to transport or sell TGC in SC
- Stock **<u>20 fish/acre of vegetation</u>** at least 10 inches long
- Maintenance stocking… 5 fish/acre of pond



Triploid Grass Carp Preferences

- Preferred
  - Naiad, Potamogeton, Bladderwort, Coontail, Spikerush, Hydrilla, Egeria
- Sometimes controlled
  - Milfoils, Pennywort, Mosquito Fern, Duckweed, Chara
- Not Controlled
  - Cattails, Alligatorweed, Waterhyacinth, watershield, Eelgrass, waterlilies, maidencane, etc

See fact sheet HGIC 1715 "*Biological Control of Aquatic Weeds*" for more details

Tilapia (Blue and Nile)
Oreochromis aureus & O. niloticus

- Tropical fish that die at temps below 50° F
- Blue Tilapia eat filamentous algae
- Nile Tilapia control other submersed plants
- Stock 200 to 400 3” fingerlings/acre of pond in April –or– 100 4-5” mature fish/acre
- Stocked at highest rate may control Duckweed and watermeal

Herbicide Regulations

- The label is the law! (FIFRA)
- SC Pesticide Control Act
  - SC DPR regulates
- NPDES Pesticide General Permit
  - SC DHEC regulates
  - Reporting thresholds
    - 200 acres of treated surface or 20 linear miles shoreline
    - $100 buy-in, NOI, management plan, and annual report (suspended)

Chemical Control

- Several herbicides are labeled for aquatic use
- You cannot apply herbicides to or over water if they are not labeled for aquatic use
- Aquatic herbicides mostly specific to plant type

Preventing Resistance

- Herbicide use leads to resistance
- Avoid resistance by alternating herbicides with different modes of action
  - Synthetic auxins (Triclopyr, 2-4,D)
  - Photosynthesis disruptors (Diquat, Fluridone, Topramezone, Endothall)
  - Enzyme inhibitors (Byspiribac, Carfentrazone, Copper, Imazapyr, Imazamox, Penoxsulam)
  - Membrane disruptors (Sod. Perox., Flumioxazin)

Think of ways to integrate your management strategies…

Example:

Phragmites and Torpedo grass are very hard to control, but we've learned that mowing these plants and allowing them to resprout greatly increases the efficacy of herbicides. The plants are forced to use stored reserves when they regrow after mowing, which makes herbicides much more effective.

Any others…?

Additional Resources

- Texas A&M http://aquaplant.tamu.edu/
- UF IFAS http://plants.ifas.ufl.edu/manage/
- USDA http://www.invasivespeciesinfo.gov/aquatics/main.shtml
- Clemson HGIC http://hgic.clemson.edu

QUESTIONS?

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